Surgical claw clippers

[Description]

The invention relates to a surgical claw-cutting tool, such as claw clippers or claw scissors, for claw-trimming that is as painfree as possible.

[Prior art]

The cutting of claws, in particular in dogs, forms part of the indispensable care of animals. If it is not done, malformations and associated pain occur. If too much is cut off from the claw during trimming, however, the blood vessels located in the claw interior are injured. The animal suffers pain and bleeding. The inappropriate cuts are in most cases due to the fact that the course of the blood vessels cannot be discerned visually, in particular in dark claws.

Safety claw clippers for domestic animals which are intended to be capable of cutting off a claw in such a way that injury of the blood vessels in the claw is excluded are known from WO 02/051242 A1. For this purpose, the claw clippers have an insertion opening, the depth of which is varied by an adjusting bolt, the length of the claw piece to be cut off consequently being limited.

The disadvantage of this invention is that the adjustment of the claw piece to be cut off takes place by feeling and, if one does not wish to hit any blood vessels, too little rather than too much is cut off. As the course of the blood vessels can be very different, cutting off without injury is not excluded.

Furthermore, a claw cutter for clean and painfree cutting is described in patent specification US 2 112 790.

In order not to hit any blood vessels when the claws are being cut, the description proposes holding the entire claw cutter with the claw against the light so that the blood vessels show through and are not injured during cutting.

This method is very awkward. In order to direct the light of the lamp onto the cutting location optimally, a number of hands are necessary, and accidental injury of the vessels is still not excluded.

[Object of the invention]

It is an object of the invention to provide a surgical claw-cutting tool which permits visual discernment of the blood vessel course immediately before cutting, so that the exact cutting point can be fixed outside living cell tissue and cutting consequently takes place without pain.

The object is achieved with the features of patent claim 1. Advantageous developments and designs form the subject matter of the dependent claims.

The surgical claw-cutting tool consists of two shearing blades which can be moved toward one another in the manner of scissors or clippers by means of two handles and form a round or curved cutting opening. A transilluminator with lighting means, preferably high-intensity light-emitting diodes, is, firmly connected to a component of the claw-cutting tool, arranged below the cutting opening.

In this connection, the transilluminator transmits a light which can transilluminate a claw in such a way that the blood vessels located therein are clearly visibly discernible.

Lighting means of different light intensities and/or wavelengths can be used for differently pigmented claws.

The claw-cutting tool can be produced in various embodiments and designs as claw clippers or claw scissors. In this connection, the transilluminator is to be arranged on and fastened to the tool body in such a way that the lighting direction or beam direction is directed toward the cutting opening or as close as possible toward it. In this connection, it can be arranged below the cutting opening on the lower shearing blade or a special holding arrangement which is connected to the body of the clippers.

Bringing the light to the cutting opening by means of light guides is also conceivable.

It is furthermore advantageous to assign the transilluminator a sensor which is capable of detecting certain spectral wavelengths, for example that of hemoglobin. In this connection, the sensor is directed toward the light cone of the transilluminator and at the same time into the region of the cutting opening. On detection of the hemoglobin, the sensor emits an acoustic and/or optical signal and/or the shearing blades are locked.

For extremely accurate cutting and with regard to stationary transillumination, it is advantageous to guide the shearing blades or the legs which hold the shearing blades not on a circular path but parallel. In this case,

the light transmitter (transilluminator) and the light receiver (sensor) are aligned accurately with one another. As both transmitter and receiver have a certain scattering cone, this is not absolutely necessary.

In a further development, a securing or clamping arrangement which secures the claw to be trimmed shortly before the cutting operation by light pressure on the handles is arranged on the claw-cutting tool. A subsequent, stronger pressure causes the elastic or resilient securing device to yield and the shearing blades to cut the claw off. For this purpose, the securing device is, depending on design and construction of the claw-cutting tool, arranged in front of or behind the shearing blades.

The geometrical design of the claw-cutting tool, whether as clippers or scissors for example, can vary in different variants and forms together with the transilluminator while maintaining functionality.

[Examples]

The surgical claw-cutting tool is explained in greater detail in a preferred embodiment with reference to drawings, in which

fig. 1 shows the claw-cutting tool in the open state with a possible arrangement of transilluminator and sensor;

fig. 2 shows an illustration of the cutting opening with the tool open according to **fig. 1**;

fig. 3 shows an illustration of the lower leg with a claw ejection opening, and

fig. 4 show successive illustrations **a**, **b**, **c** and **d** which explain the cutting-off of a claw with the claw-cutting tool.

Fig. 1 illustrates a claw-cutting tool in the form of claw clippers with open shearing blades **5**, **6** and consequently an open cutting opening **15** (see also **fig. 2**). By pressing the handles **1**, **2** together, the shearing blades **5**, **6** are moved toward one another by means of two legs **3**, **4** and the cutting opening **15** is closed. A spring **7** ensures that, when the pressure on the handles **1**, **2** is reduced, the cutting opening **15** opens again automatically.

A transilluminator **8** is arranged below the cutting opening **15** on the lower shearing blade **6** or on a special holding arrangement. The basic body of the transilluminator **8** is fastened firmly, but preferably detachably, to the shearing blade **6** or to the lower leg **4**.

The power supply for the transilluminator **8** is brought about by means of a power line **14** from a battery **10** located in the interior of a handle **2** and by means of an on/off switch **11**. The power line **14** can of course also be run in a concealed way.

The transilluminator **8** is arranged below the cutting opening **15** in such a way that it does not impede the cutting operation but brings the light **19**, **20** close to the cutting opening **15**, and/or the light beam **19**, **20** of the transilluminator **8** is directed at an angle toward the cutting opening **15**. The transilluminator **8** is preferably fastened detachably for exchange.

The shape of the shearing blades **5**, **6**, the cutting opening **15** and the force transmission from the handles **1**, **2** to the shearing blades **5**, **6** is preferably selected in such a way that a claw **17** to be trimmed (illustrated in **fig. 4**) is fixed before cutting by light manual pressure on the handles **1**, **2**, in order for it to be possible to control the exact cutting point safely.

As illustrated in **fig. 1** and **fig. 4**, a securing device **13** in the form of a flexible body is preferably arranged behind the shearing blades **5**, **6** for fixing the claw **17**. The flexible bodies of the securing device **13** are in this embodiment fastened both at the top to the upper leg **3** and at the bottom to the lower leg **4** and dimensioned in such a way that, with light pressure on the handles **1**, **2**, the claw **17** is not yet caught by the shearing blades **5**, **6** but is already held securely. A stronger pressure on the handles **1**, **2** causes the flexible bodies **13** to yield and the shearing blades **5**, **6** to bite into the claw **17** (see also **fig. 4**).

In **fig. 1**, a sensor **9**, which measures the absorption of the light **19**, **20**, or detects the spectral wavelength of the red blood cells **18**, is furthermore fastened to the upper shearing blade **5** opposite the transilluminator **8**. The signal of the sensor **9** is emitted in a suitable way, here by means of a speaker **12**. However, the cutting tool could also be locked if a blood vessel **18** is located in the region of the sensor **9**.

The illustration in **fig. 2** shows the claw-cutting tool according to **fig. 1** with open shearing blades **5**, **6** and insertion-ready cutting opening **15** from the front. The transilluminator **8** is arranged on the lower shearing blade **6**, and the sensor **9** is located opposite it.

Fig. 3 shows the lower leg **4** of the claw-cutting tool with the lower shearing blade **6** and the transilluminator **8** seen from below. The lower leg **4** also has a cutout which serves as a claw ejection opening **16.**

The diagrams **a, b, c** and **d** of **fig. 4** explain the functioning of the claw-cutting tool during cutting-off of a claw **17.** In **fig. 4a,** the claw **17** has been inserted too far into the cutting opening **15.** The sensor **9** recognizes, for example owing to the higher absorption of the transmitted light **19, 20,** illustrated here as a reduced light beam **19,** or owing to a spectral change of the light **19, 20** of the transilluminator **8,** that a blood vessel **18** has been detected. In this case, the speaker **12** emits a signal.

The flexible bodies **13** attached to the legs **3, 4,** which serve as a securing device for the claw **17,** fix the claw **17** and at the same time reduce the risk of unintentional premature cutting-off.

The cutting tool is then, as illustrated in **fig. 4b,** pulled back until the light **19, 20** passes through the claw **17** unreduced (unreduced light beam **20**). The claw **17** is now located in the correct position. Furthermore, the securing device **13** ensures that the claw **17** remains in this position and does not slip. With the transilluminator **8** switched on, it is also possible to monitor purely visually whether a blood vessel **18** is located in the beam path and consequently in the cutting opening **15.**

Claw-cutting can then, as illustrated in **fig. 4c,** be carried out at the correct place without injuring the blood vessel **18.** The flexible bodies of the securing device **13,** which are preferably made of rubber, are

compressed during cutting, so that slight resistance has to be overcome in the process.

Lastly, **fig. 4d** shows the cut claw **17** with the cut-off claw end **21**, which has been ejected through the cutout **16** in the lower leg **4** by means of the flexible body **13**.

[List of reference numbers]

1 upper handle
2 lower handle
3 upper leg
4 lower leg
5 upper shearing blade
6 lower shearing blade
7 compression spring
8 transilluminator
9 optoelectronic sensor
10 battery compartment with electronics parts
11 on/off switch
12 speaker
13 flexible bodies, securing device
14 power line
15 cutting opening
16 claw ejector
17 claw
18 blood vessel
19 reduced light beam
20 unreduced light beam
21 cut-off claw end